Pulmonary embolism (PE), isolated and combined with deep-vein thrombosis (DVT), carries worldwide a high risk of complications, including death. Unfavorable structure and function of fibrin (a protein formed from fibrinogen during blood clotting) network, which represents a major component of thrombi, is a new risk factor for thromboembolism. It is now believed that structure and function of fibrin networks variable in clinically stable patients with chronic diseases as well healthy people. Based on this concept, alterations to clot properties observed during acute myocardial infarction, stroke or venous thrombosis are perceived as unspecific and unimportant for the risk of recurrences or other complications. To our knowledge, there have been no reports on the presence or absence of the association between features of fibrin clots determined in acute PE and clinical outcomes.

We sought to investigate whether transient changes in complex processes of fibrin clot formation, properties (for example elasticity) and degradation in patients with acute PE are important for prognosis and how much actually fibrin clots are changed during acute PE.

We put forward the following hypothesis. Fibrin clot properties observed in patients with acute PE and their changes during the first hours of therapy contribute to the natural course of PE.

Our project will also describe clot structure and function, in particular fibrinolytic degradation, using state-of-the-art experimental approaches for example scanning and confocal electron microscopy. Experiments will be performed in plasma obtained from 150 patients hospitalized for acute PE on admission, after the initiation of anticoagulant treatment and then 3 and 12 months since the PE episode. We will also perform using two key proteins purified from plasma samples of the patients, namely fibrinogen and plasminogen, from which plasmin, a major fibrinolytic enzyme is generated. We will to explore the potential mechanisms (in particular oxidation) through which acute PE alters fibrin characteristics.

Novel future therapies aimed at improving fibrin clot structure, or precisely making it more “normal”, may be an attractive option in the prevention and treatment of such common diseases as PE, myocardial infarction, stroke or venous thrombosis.